

### REMARKS

Claims 31 and 34-63 are now in this application.

The examiner's indication of allowability for claims 34-36, 38, 40 and 44-49 is gratefully acknowledged.

The examiner has rejected claim 63, saying that it fails to further limit claim 31. Accordingly, claim 63 has been made independent by incorporating into it only the appropriate language from claim 31 so that claim 63 no longer has the inconsistency pointed out by the examiner.

The examiner has rejected claims 31-33, 37, 39, 41-43, 50-53, 55-57, 60 and 62 as unpatentable over by Frank et al, WO 99/08330 in view of Onishi, JP 55-134990.

First, it is pointed out that claim 31 has been amended to include, among other limitations, "a first seam (31) in the hollow body extending parallel to the longitudinal axis (35), of the hollow body, and

at least one second seam (33) which is located diametrically opposite the first seam (31), and located selectively at one or both end portions of the hollow body **but not medially thereof.**"

In other words, claim 31 now positions the second seam opposite the first seam and also the second seam is limited to be only at one or both ends of the hollow body, and not at its central portion. Neither of the references to Frank et al nor to Onishi teaches this structure. And further, as pointed out in the specification, particularly at paragraphs 5-9 and elsewhere, this specific structure provides specific advantages over and above the structure taught by the prior art.

In Frank et al there is no second seam, only a first seam 16.

In Onishi the insulating case 6 is formed by two semi-cylindrical body portions 6a and 6b. This is brought about by the necessity to assemble the piezoelectric unit with an intermediate terminal 2 within a housing that has a press fit between the piezoelectric elements. The terminal 2 has a lead which runs outside the insulating case via the takeout cylinder 6d. As can be seen from Onishi, one seam is located where the edges 6e come together. Onishi seems to recite a second seam, although as shown in figure 1 this second "seam" could well be merely a fold, in which case the structure as shown in figure 2 does not have a second seam, but only an area where the fold is later unfolded.

However, even if this second area of Onishi is a seam, it is opposite this first seam and it runs the entire length of the housing 6. Thus, even with this reading of Onishi, the structure still does not teach all of the structure recited in applicant's claim 31. In applicant's claim 1 the second seam does not extend through the middle portion of the housing, but rather is limited to being only at one or both end portions, and is further limited to not appearing at the medial portion of the housing.

And further, from Onishi it is not even known to use the insulating case as a hollow spring that applies its spring force in the axial direction of the piezoelectric elements. As a result, one skilled in the art would not consider Onishi as being prior art which would be relevant to how the axial spring of Frank et al might be modified. And even if a one skilled in the art would study Onishi, the artisan would only extract a teaching that does not lead to the claimed invention. Onishi teaches to apply radial forces via the protruding coils 6c to the piezoelectric elements. This teaching is contrary to the claimed invention and also to the

teaching of Frank et al, both of which apply a force in the axial direction of the piezoelectric elements.

And further, the takeout cylinder 6d of Onishi weakens the housing in its axial direction. As a result the resilience of the housing 6 cannot be symmetrical. The importance of the symmetry is described in detail for example with respect to figure 3 of this application. As a result the case described by Onishi has the same disadvantages as the hollow springs known from the prior art as described in the introduction of this application, particularly at paragraphs 2-3 and 7. As described therein, the piezoelectric elements of Onishi would suffer a bending moment, if the insulating case of Onishi were used to provide an axial spring force. Thus, counsel for applicant believes that in Onishi the case 6 is not even used to provide an axial spring force to the piezoelectric elements.

In opposition to this, the structure as specifically recited in claim 31 includes recitation of structure which avoids such bending forces from the spring. This is as described in paragraphs 5-9 of the specification.

The examiner has also rejected claim 54 as unpatentable over Frank et al in view of Onishi and Voigt et al, and claims 57-59 and 61 as unpatentable over Frank et al in view of Onishi and Kienzler et al.

In reply to these rejections, it is pointed out that neither of the additional references, not Onishi, not Voigt et al, and not Kienzler et al includes anything at all like the second seam as it is recited in claim 31. Thus there is no possibility that the prior art cited in the examiner's action could provide a teaching of the structure as recited in applicant's broadest claim 31, which structure, as pointed out above, includes structure which gives the

unexpected and advantageous result that the hollow body cannot act on the actuator with any side wise or bending forces.

The examiner has rejected claim 63 as unpatentable over Frank et al in view of Onishi, saying that placing the piezoelectric elements outside the hollow body is an obvious rearrangement of parts. This rejection does not seem to be well founded because, as pointed out above, it is not seen that the casing 6 of Onishi is an axial spring. It might well be a radial spring, with coils 6c providing a radial force on the piezoelectric elements, but it is not seen that the case 6 provides any axial force. Thus, since case 6 is not believed to be an axial spring, it is not seen how it could be considered proper for this case to be used as a teaching of how to modify the axial spring of Frank et al.

Since the cited prior art does not teach the structure as recited in the claims of this application, all of the claims should be considered to be allowable.

Appl. No. 10/553,419  
Amdt dated October 5, 2007  
Responsive to Office action of July 10, 2007

For all of the above reasons, whether taken singly or taken together, entry of this amendment and allowance of the claims are courteously solicited.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'R. E. Greigg', with a stylized flourish at the end.

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